

INSECT MUSICIANS AND THEIR AUDIENCES

INSECTS are a silent people in the main. Many of them pass through life without uttering a single sound. But there are some interesting exceptions to this rule.

The harvest flies, or cicadas, for example, are notoriously noisy, the "song" of some species having been compared to the shrill whistle of a locomotive engine. They are very abundant in the warmer regions of both hemispheres. The males alone are tuneful—a fact which was commented upon by certain of the Greek poets and philosophers, one of whom wrote: "Happy the cicadas live, since they all have voiceless wives."

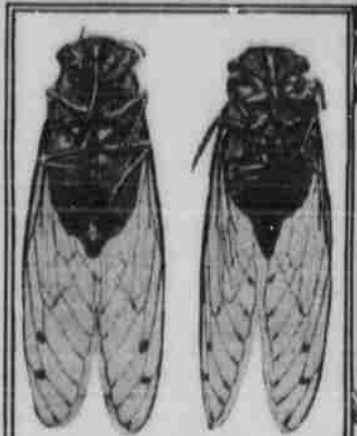
Strictly speaking, however, the cicada is not a vocalist, but an instrumentalist. The sounds that it makes are due to a special mechanism which resembles a pair of kettledrums. These have their place in cavities on each side of the thorax, and are protected beneath by large plates which may possibly act also as soundingboards. The membranes of the drums are not beaten, but are thrown into rapid vibration by a special set of voluntary muscles, the result being the loud, shrill music for which the cicada is famous.

Apart from the cicadas, the only other notably sonorous insects are found in the group which naturalists term the "leaping orthoptera"—i. e. the grasshoppers, crickets and their allies. In these instances the analogy of the drum must be discarded for that of the fiddle. Let us take first the grasshoppers. Everyone has listened to their chirping, and perhaps some inquiring spirits have observed that the sound is always accompanied by a kind of swaying of the insect's body, and an alternate movement of its hind legs. But the full inwardness of the matter can only be appreciated by the aid of the microscope. On a certain ridge on the inner side of the grasshopper's hind femur—the thigh of the great leaping leg—there is a row of extremely modified hairs. This ridge represents the bow of the sound-producing apparatus. By the movement of the leg it is rubbed to and fro against a prominent nervure or "vein" of the closed fore-wing; and this fiddling process gives rise to the grasshopper's well-known "song."

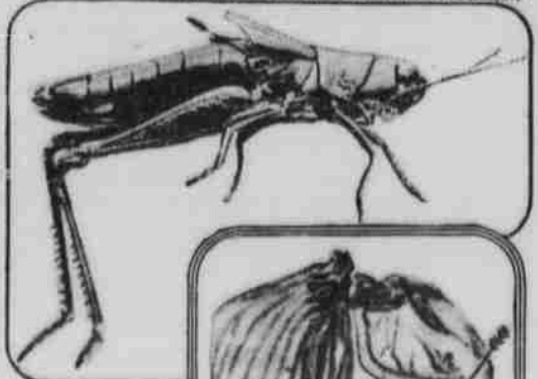
Naturalists call the method "stridulation." In the case of the crickets it is managed in a different way, viz. by rubbing one wing over the other. Each fore-wing of the male is furnished with a vein which is minutely ridged or fluted on its under side; and this bow plays upon a vein on the upper surface of the wing beneath it. As the apparatus is in duplicate—each wing having its vein and bow—the insect is ambidextrous, so to speak. In practice, however, it is found that the right wing is generally, though not always, uppermost. The reverse is true of the long-horn, tree-frequenting grasshoppers. Their solitary fluted bow is found on the underside of the left fore-wing, which is always uppermost. In these insects—and in the crickets to a lesser extent—the overlapping fore-wings form a kind of resonating chamber which intensifies the volume of each note that the fiddler produces.

Time and Temperament.

Dr. S. H. Scudder, an eminent observer of insect life in America, has expressed some of the songs of crickets and grasshoppers in musical notation. He has also recorded the curious fact that there is a distinct relation between the rapidity of note production and the temperature. On warm days, when the sun is shining brightly, these little musicians fiddle away with all their might, whereas in dull and chilly weather their execution is slow and mournful. Many crickets, however, remain silent until the shades of evening begin to fall, and then begin loudly to serenade their lady-loves. For this is really the outcome of the whole matter. Only in rare instances do female insects possess the gift of melodious expression. As with the singing of birds, so with the drumming and fiddling of insects, each is essentially the language of courtship. Love makes the world go round! Crickets have been observed to listen eagerly—one might say, critically—to the performances of their wooers, as if anxious to get the full



A PAIR OF CICADAS SEEN FROM BELOW



A YOUNG GRASSHOPPER, THE WINGS STILL SUPPLEMENTARY



FORE-WING OF THE COMMON FIELD CRICKET (MALE) SEEN FROM UNDER-NEATH. GREATLY ENLARGED.

benefit of every note produced. But how does an insect "listen"? In most insects the auditory organs if they can be demonstrated at all, take the form of excessively minute structures connected with nerves. These structures, which are microscopic hairs, and cavities, are found most commonly upon antennae, but they may also occur upon other parts of the body.

So far as the writer is aware, the cicadas have not been shown to possess any specialized "ears." We are thus left to assume that they gain their impressions of sound by means of scattered sense organs such as those which have just been mentioned.

Indeed, some authorities are of opinion that cicadas do not hear at all in our sense of the word, but that they "feel" rhythmical vibrations.

Insects With Ears.

With grasshoppers and crickets, however, the case is quite different. These insects undoubtedly possess

ATTACKED BY TINY RATTLER

Venomous Pygmy Reptile Was Hidden in a Log Near King Snake Eggs.

In a small pond we captured several of the banded water snakes (*Tropidonotus fasciatus*). One, a large and richly marked specimen, was lying as he was among the short growth of vegetation. I nearly stepped on him before I saw him. On placing the forked stick over him he wound up it as far as he could and struck viciously at everything in reach, but was soon grasped by the neck and placed into a bag. These water snakes, though nonvenomous, were by a great majority of the people we met thought to be very poisonous.

Many snakes were uncovered in turning over the logs; mostly very young cottonmouths, which very strongly resemble the young copperheads (*Aneides* *contortrix*) and the pygmy rattlers (*Sistrurus miliarius*). This diminutive rattlesnake would generally be found coiled on the projecting base of a palm and covered by a palm fan. None that we caught made any attempt to escape, but they were ready to do mischief if they had the chance. They were so small, generally from 12 to 18 inches, that their rattling could not be heard unless held close to the ear.

My partner had a narrow escape from being bitten by one of them. He had broken open a hollow log on the

ears—elaborate structures admirably adapted to receive and transmit sound waves. But the external openings of these organs are most surprisingly located. In crickets and long-horn grasshoppers there are two curved slits in the tibia or shin of the fore-leg, one on each side, just below the "knee." These are the openings of the ears! Each slit gives access to a tympanum, or "drum," which is connected with air spaces and nerve endings. In the case of the short-horn grasshoppers, the ears occupy an equally unexpected position, viz. at the base of the abdomen. The opening on either side may be found beneath the wings, just above the attachment of the great hind-leg.

It will be well, in conclusion, to emphasize the fact that the noises made by insects are strictly instrumental. No insect has a "voice"—that is, the power of producing sounds by the expulsion of air from the lungs through the throat and mouth. Indeed, insects have no lungs, nor do they use their mouths for breathing. On the contrary, they take in atmospheric air through a number of small openings along the sides of the body. These openings are called "spiracles." They give access to an elaborate system of minute pipes, or "tracheae," which ramify among the insect's living tissues and convey to them the oxygen necessary for the discharge of the various vital processes. Just within each spiracle there is an ingenious little valve which is opened and closed by a muscular contraction. The circulation of air, to and fro through the spiracles, is kept up by a constant palpitating movement of the whole abdomen. This may be seen, for example, in a wasp that is regaling itself in the dish of fruit on our table; but in the case of a hibernating queen wasp, the body is practically motionless—the reason being that the insect's dormancy is so complete that it requires scarcely any oxygen to continue in being.

The nearest approach to a true "voice" among insects is the humming sound produced by a mechanism within the spiracles. If we shut up a bee in a box, we shall find that it is able to hum loudly, even though it may be unable to agitate its wings. The mechanism is too complicated to describe here; but it may be roughly likened to a wind instrument, such as a cornet.

Inside of which were a number of empty shells of snake eggs—probably the king snake or blacksnake—and as he reached to pick one of them up for closer examination he caught sight of a pygmy rattler coiled partly under some pieces of the rotting core of the log and jerked his hand away just in time, for the little snake struck viciously, narrowly missing it.

We broke open all the hollow logs which we found, and in doing so found several very fine specimens of the king snake (*Ophibolus getulus*). Usually when we found one we would find another one very close by. These snakes, while of a rather quarrelsome disposition among themselves or with other snakes, are remarkably gentle with man. Not one of the several we caught made any attempt to bite, nor showed any nervousness. When handled they would usually coil tightly around the arm, probably to prevent falling, and then would start slowly on an exploring expedition. These snakes are powerful constrictors, feeding principally upon obnoxious rodents and other snakes; they have been known to kill the deadly diamondback rattlesnake (*Crotalus adamanteus*), although they have no preference and will as readily kill and devour the non-venomous species. — From "Snake Hunting in Florida," in the New York Sun.

Old Acoma.

Acoma, N. M., an Indian pueblo, is the oldest inhabited settlement in the United States.

RAISING DRY LAND POTATOES

Best Soil on Farm Should Be Selected by Those Who Desire Success—Plow Deep as Possible.

(By A. J. SILCOCK, Oetrichs, S. D.)

The man who desires success in potato raising should select the best land on his farm for this crop. In the preparation of the soil, backsetting is best, if possible. The sod should be double disked as early as possible in the spring and harrowed after each rain as soon as dry enough to handle.

If the weather is favorable, the potatoes should be planted as soon as possible after the 20th of April.

Get good, clean, home-grown seed, free from scab. I advise some early variety; the Early Ohio is good. If possible, cut the seed potato so as to have but one eye to a section. When ready to plant, plow (at least six inches) and drop the potatoes into every fourth furrow. If furrows are narrower than 12 inches, drop seed into every fifth furrow or so that the rows are about our feet apart. Drop one piece of seed potato in a place, averaging about fifteen to twenty inches apart.

If one desires extra fine potatoes, the ground should be plowed as deep as possible, and the potato seed covered not less than six inches.

As soon as through planting, the land should be harrowed, and harrowing should not be neglected after rains until the potatoes are five or six inches high. Harrowing should be done each time in a direction opposite to the last previous harrowing. After the potatoes are up six inches, the harrow should be discarded and the cultivator used after deep rain until the plants are in bloom. The first cultivation should be deep, but subsequent cultivations should be as shallow as possible to give results—that is, kill the weeds and keep the mulch. Cultivations of the ripening plant should not be so close to the plant as in early growth.

The cultivator will always leave some weeds near the plants. These should be cut out carefully, but the land should never be "hilled up," as the plants do much better with leveled land.

Potatoes can be produced on sod land if dropped into the furrow of the breaking plow, provided the land is soft or sandy; but with heavy soil the land should be broken at least three inches deep and then chopped up with a disk. After disking it should be plowed about five inches deep and the potatoes dropped into the furrow.

EXCESSIVE BLOWING OF SOIL

Subject of Vital Importance to Many Farmers—Moving Dirt Acts Much Like an Auger in Action.

It is only where there is excessive blowing of the soil that damage occurs. It is a well-known fact that if one can prevent the soil from starting on the windward side, the problem has been solved. When once the wind begins to move the soil from the windward side of the field, the moving dirt acts much like an auger, working and twisting, loosening and lightening the soil in front of it, until the wind sweeps freely through or across the field, taking the loosened soil and leaving the exposed roots to wither and die.

The movement of soil is natural. Both wind and water serve as vehicles for the continual carrying of dirt from place to place. It would be quite impossible to prevent absolutely the movement of soil, but it is by no means an impossibility to prevent dangerous movement.

Building Poultry House.

In constructing a poultry house, try to secure the largest pen room at the lowest cost, and remember, if you keep heavy fowls to provide them ladders on which to reach the roosts. A board with cleats nailed across it at intervals is good enough.

Grinding Corn for Cattle.

Grinding corn for the cattle makes more beef and less pork from the same amount of corn. If the hogs follow the cattle it does not pay to grind, especially when hogs are about as high in price as cattle, for generally the combined amount of beef and pork is greater from whole corn than from ground corn.

Scours and Thumps.

Scours and thumps often cause very serious losses among young pigs. They usually are caused by overfeeding, feeding badly spoiled feed, sudden change in feed or by lack of exercise.

Sand and Dust for Hens.

Have the sand and dry-dirt boxes in good shape. Hens need the dust. The sand is best for grinding and should be placed in hoppers that no dirt may become mixed with it.

Skim Milk Fed to Young Pigs.

When skim milk is fed to young pigs they should be started on it gradually and it should always be fed with a little meal and other feed.

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Women's complaints often prove to be nothing else but kidney trouble, or the result of kidney or bladder disease.

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People who believe that rock and rye will cure a cold usually have one

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